

WHAT IS CLAIMED IS:

Sub A37 1. A transmitting and receiving apparatus comprising:
modulating means for modulating an input digital data; first
frequency converting means for converting a signal output
from said modulating means into a signal of a predetermined
frequency; amplifying/branching means for amplifying and
branching a signal output from said first frequency converting
means; second frequency converting means for converting a
signal output from said amplifying/branching means, into a
signal of a predetermined frequency; and demodulating means
for demodulating a digital data from a signal output from
said second frequency converting means, wherein

each of said first and second frequency converting
means comprises a PLL frequency synthesizer,

said demodulating means has a carrier recovery section,
and

natural angular frequencies of said PLL frequency
synthesizers are set to be equal to a maximum frequency of
mechanical vibrations which are externally applied, or in
a predetermined width above and below the maximum frequency,
or

a loop filter bandwidth of said carrier recovery
section is set to be higher by a predetermined amount than
the maximum frequency of mechanical vibrations which are
externally applied.

2. A transmitting and receiving apparatus according to claim 1, wherein the predetermined width is a range of $\pm 50\%$ above and below with respect the maximum frequency, and the predetermined amount is 5 kHz.

3. A transmitting and receiving apparatus according to claim 1, wherein each of said PLL frequency synthesizers has:

a PLL synthesizer IC to which a crystal oscillator is externally connected; a loop filter which filters a signal output from said PLL synthesizer IC; a voltage controlled oscillator in which an oscillation frequency is changed in accordance with a signal output from said loop filter; an amplifying IC which amplifies a signal output from said voltage controlled oscillator; and a branch coil which branches a signal output from said amplifying IC, and

one of signals output from said branch coil is input to said PLL synthesizer IC.

4. A transmitting and receiving apparatus according to claim 2, wherein each of said PLL frequency synthesizers has

a PLL synthesizer IC to which a crystal oscillator is externally connected; a loop filter which filters a signal

output from said PLL synthesizer IC; a voltage controlled oscillator in which an oscillation frequency is changed in accordance with a signal output from said loop filter; an amplifying IC which amplifies a signal output from said voltage controlled oscillator; and a branch coil which branches a signal output from said amplifying IC, and

one of signals output from said branch coil is input to said PLL synthesizer IC.

5. A transmitting and receiving apparatus according to claim 1, wherein said carrier recovery section has:

an A/D conversion section which converts an input analog signal into a digital signal; a quadrature detection section which performs quadrature calculation on a data output from said A/D conversion section; a modulating component removal section which removes modulating components from a data output from said quadrature detection section; a digital filter section which filters a data output from said modulating component removal section; and an oscillation section in which an oscillation frequency is changed in accordance with a data output from said digital filter section, and

each of said oscillation section and said A/D conversion section input a data to said quadrature detection section.

6. A transmitting and receiving apparatus according to claim 2, wherein said carrier recovery section has:

an A/D conversion section which converts an input analog signal into a digital signal; a quadrature detection section which performs quadrature calculation on a data output from said A/D conversion section; a modulating component removal section which removes modulating components from a data output from said quadrature detection section; a digital filter section which filters a data output from said modulating component removal section; and an oscillation section in which an oscillation frequency is changed in accordance with a data output from said digital filter section, and

each of said oscillation section and said A/D conversion section input a data to said quadrature detection section.

7. A transmitting and receiving apparatus according to claim 1, wherein a phase comparison frequency of a PLL synthesizer IC included in said PLL frequency synthesizer is set to be higher than the maximum frequency of mechanical vibrations which are externally applied.

8. A transmitting and receiving apparatus according

to claim 2, wherein a phase comparison frequency of a PLL synthesizer IC included in said PLL frequency synthesizer is set to be higher than the maximum frequency of mechanical vibrations which are externally applied.

9. A transmitting and receiving apparatus comprising: modulating means for modulating an input digital data; first frequency converting means for converting a signal output from said modulating means into a signal of a predetermined frequency; amplifying/branching means for amplifying and branching a signal output from said first frequency converting means; second frequency converting means for converting a signal output from said amplifying/branching means, into a signal of a predetermined frequency; and demodulating means for demodulating a digital data from a signal output from said second frequency converting means, wherein

each of said first and second frequency converting means comprises a PLL frequency synthesizer,

said demodulating means has a carrier recovery section, and

a coil used in an oscillation section of a voltage controlled oscillator included in each of said PLL frequency synthesizers is a microstrip line.

10. A transmitting and receiving apparatus comprising:

each of said first and second frequency converting means comprises a PLL frequency synthesizer,

said demodulating means has a carrier recovery section,
and

a reinforcing plate is pasted to an upper side and/or a lower side of a microstripline used in an oscillation section of a voltage controlled oscillator included in each of said PLL frequency synthesizers.

11. A transmitting and receiving apparatus comprising:
modulating means for modulating an input digital data; first
frequency converting means for converting a signal output
from said modulating means into a signal of a predetermined
frequency; amplifying/branching means for amplifying and
branching a signal output from said first frequency converting

means; second frequency converting means for converting a signal output from said amplifying/branching means, into a signal of a predetermined frequency; and demodulating means for demodulating a digital data from a signal output from said second frequency converting means, wherein

each of said first and second frequency converting means comprises a PLL frequency synthesizer,

said demodulating means has a carrier recovery section, and

a coil used in an oscillation section of a voltage controlled oscillator included in each of said PLL frequency synthesizers is of a chip surface mount type.

12. A transmitting and receiving apparatus comprising: modulating means for modulating an input digital data; first frequency converting means for converting a signal output from said modulating means into a signal of a predetermined frequency; amplifying/branching means for amplifying and branching a signal output from said first frequency converting means; second frequency converting means for converting a signal output from said amplifying/branching means, into a signal of a predetermined frequency; and demodulating means for demodulating a digital data from a signal output from said second frequency converting means, wherein

each of said first and second frequency converting

means comprises a PLL frequency synthesizer,

said demodulating means has a carrier recovery section,
and

a microstrip line used in an oscillation section of a voltage controlled oscillator included in each of said PLL frequency synthesizers is formed by an inner layer of a printed circuit board.

13. A transmitting and receiving apparatus comprising:
modulating means for modulating an input digital data; first frequency converting means for converting a signal output from said modulating means into a signal of a predetermined frequency; amplifying/branching means for amplifying and branching a signal output from said first frequency converting means; second frequency converting means for converting a signal output from said amplifying/branching means, into a signal of a predetermined frequency; and demodulating means for demodulating a digital data from a signal output from said second frequency converting means, wherein

each of said first and second frequency converting means comprises a PLL frequency synthesizer,

said demodulating means has a carrier recovery section,
and

capacitors used in a loop filter and a voltage controlled oscillator included in each of said PLL frequency

synthesizers are of a film type.

14. A transmitting and receiving apparatus comprising: modulating means for modulating an input digital data; first frequency converting means for converting a signal output from said modulating means into a signal of a predetermined frequency; amplifying/branching means for amplifying and branching a signal output from said first frequency converting means; second frequency converting means for converting a signal output from said amplifying/branching means, into a signal of a predetermined frequency; and demodulating means for demodulating a digital data from a signal output from said second frequency converting means, wherein

each of said first and second frequency converting means comprises a PLL frequency synthesizer,

said demodulating means has a carrier recovery section, and

a reinforcing plate is pasted to an upper side and/or a lower side of a microstrip line used in an oscillation section of a voltage controlled oscillator included in each of said PLL frequency synthesizers, and a rubber member is inserted between said reinforcing plate and an outer shield cover.